OBSERVATIONS on *TESTUDO NIGRITA*, DUM. & BIBR.

By Edgar R. Waite, F.L.S., Zoologist.

(Plates xx., xxi., and xxii.)

Until recently, living in the grounds of the Hospital at Gladesville, near Sydney, were two Gigantic Land Tortoises. In April, 1896, I availed myself of a long-standing invitation from Dr. Eric Sinclair to inspect these tortoises with a view of determining the species and to verify, if possible, the common belief that the larger of the two originally came from the Galapagos Islands, the home of one of the three races of gigantic land tortoises.

I then understood that little or nothing was known of the history of these huge Chelonians; it was therefore, in the first place, necessary to determine the species. An examination showed that although the two individuals differed slightly, attributable to their being of opposite sex, they were of the same species. The absence of a nuchal plate, together with a divided gular, and the presence of an enlarged scute on the inner side of the fore-limb, at once indicated that they were from the Galapagos Islands. Of the six species inhabiting the group, three only have the shields of the carapace concentrically striated, as exhibited by our specimens. The anterior declivity of the carapace, taken in conjunction with the feature of the plastron, namely, being deeply notched behind, at once enables us to determine the species as:—

Testudo nigrita, *Dum. & Bib.**

I had hoped to fully describe the species, and so close a gap in our knowledge of the several forms; pressure of work has hitherto prevented my doing so, and, notwithstanding the facilities we possess in the way of material, I cannot look forward to sufficient leisure at any near date. The male is now in London, but is still, I believe, alive, so that its osteological characters are not ascertainable. The female died in August, 1896, and then passed into the possession of the Museum. Being desirous of preserving it in a life-like condition, and at the same time not wishing to sacrifice such a valuable skeleton, a novel experiment was tried and proved to be most successful. Casts were taken of the carapace, plastron, and head; the skin was next carefully removed, and so worked up in conjunction with the casts that no one could now detect the deception, and the production occupies a

* Duméril et Bibron—Erpét. Génér., ii., 1835, p. 80.

prominent position in the Reptile Gallery. The entire skeleton was thus preserved, and being carefully articulated, is exhibited in the Osteological Gallery. It is, therefore, still available for study should opportunity occur. (See Plate xxii.)

Failing the work I had proposed, it appears to be advisable to publish such information as I have been able to glean relative to the history of the specimens. In this connection I have to thank Dr. Sinclair, who has spared no pains, and who has himself made some of the observations below recorded.

In the Hospital grounds these reptiles had almost unlimited freedom, and their feed of herbage was largely supplemented by vegetables—lettuces being much appreciated; an entire plant was taken from the hand, and after two or three movements of the jaws was swallowed. Eating seemed to be a constant occupation. For my benefit the tortoises were prodded about the grounds; they were very disinclined to move and only did so in response to repeated persuasions from a stick directed at the hind limbs. I was much interested to notice that when touched in this way the tortoise would suddenly drop its shell over the leg prodded, and so endeavour to protect itself, and at the same time cripple the offender. One of the men engaged in trundling the reptile used his foot for the purpose, but this was considered an unwise proceeding, for on one occasion, I was told, when kicking the leg of the reptile an attendant had his foot badly crushed.

When turning the smaller reptile (the female) about, two or three men proved to be sufficient. When the male was under consideration, Dr. Sinclair told off five men, and in consequence of the enormous weight and the struggles of the huge creature, they were scarcely able to turn it over. More help was required when it had to be placed on the weighing machine, and even when once there it managed, by hitching its claws into the standards, to force itself off, despite all efforts to prevent it. Finally, the correct weight was obtained, and when the reptile was permitted to regain its legs I noticed that blood was issuing from between the shields of the carapace.

The tortoises were propped up so as to show their under-surfaces. The photographs I then took are reproduced on Plate xxi., and exhibit several points of interest, not otherwise observable. That of the female (Fig. 2), propped against the Hospital wall, shows the enlarged scute on the fore-leg very clearly, also the depression in the plastron, the divided gular and the notch between the xiphiplastra with the angles rounded; the short tail is also well illustrated, as are also the sutures of the plastron and the characteristically wrinkled skin.

Owing to its weight and bulk, the male could not be retained vertically against the wall, and as it absolutely refused to be

further handled, we had to make the best of things. Although not so good, the photograph (Plate xxi., Fig. 1) shows sufficiently the principal secondary sexual characters; these are:—the great concavity of the plastron, the angular aspect of the xiphiplastral plates, and the comparatively long tail.

At the time of my visit, the upper posterior portion of the carapace of the female was much abraided, owing to the efforts of the male, who had been paying her considerable attention.

As each tortoise has its individual history, the two may now be treated separately.

The Male Tortoise.

The male was commonly called "Rotumah" in the gardens and is, I find, directly traceable to the Galapagos Group, but from which island it was obtained is not known. This is to be regretted, as it is the only species whose definite habitat has not been ascertained.

For particulars of the early history of this tortoise I am indebted to Miss Annie C. E. MacDonald. About the year 1866 it was given to her father, the late Alexander MacDonald, by King George of Tonga, and was what was called a "chief's gift," that is, a gift supposed to pass between two great chiefs of equal standing. When taken to Tonga from Rotumah, the reptile caused a great sensation among the natives, and was presented to Mr. MacDonald in recognition of his kindness to the King's son when in Sydney, both father and son having taken a violent fancy to the well-known trader.

The tortoise was brought to Sydney in the schooner "Ida," one of MacDonald and Smith's whalers. Captain Howard, who was in command of the vessel, had known the tortoise for fifty years previously on the island of Rotumah, it having been landed there from the Galapagos Islands by an American whaler many years before. It was within the memory of the inhabitants, always of the same size.

From 1866 to the end of 1896 the tortoise lived in Sydney, and at the later date was removed to England, having been purchased, I understand, by the Hon. Walter Rothschild for his menagerie at Tring. When the tortoise passed into the possession of Mr. MacDonald he had it photographed, and the accompanying illustration (Plate xx.) is reproduced from a copy kindly lent by Miss MacDonald. On the margin of this copy are a number of measurements made by the owner at the time. These I reproduce (*in lit.*) below:—

	Ft.	in.
Length, nose to tail	6	2
,, shell	4	7½
,, across shell	5	10½
,, under shell	3	0
Girth	8	3

	Ft.	in.
Height, lying down	2	$2\frac{1}{4}$
,, standing up	3	1
Front leg, under knee	1	$7\frac{1}{2}$
,, round elbow	2	$1\frac{1}{2}$
,, round foot	1	11
Hind leg, instep	1	$9\frac{1}{2}$
Head, round head	1	7

Weight—5 cwt. 2 qrs. 26 lbs. = 642 lbs.

These figures were, I find, published in 1884 by Dr. J. C. Cox,* who, while stating that the reptile came from Rotumah, was unaware of its having been at Tonga prior to passing into the possession of Mr. MacDonald. From this account it appears that the Galapagos Group was then thought to be the original habitat of both the tortoises, for Dr. Cox writes:—"I am not at all sure as to what species these two Tortoises belong, but they are supposed to come from Galapagos Archipelago."

The next measurements available, are a few made by Dr. Sinclair, in 1893, for comparison with the gigantic tortoise living at Port Louis, in Mauritius, of which an account appeared in the *Illustrated London News*:—

	Port Louis.			"Rotumah."	
	Ft.	in.		Ft.	in.
Fore leg...	1	$7\frac{3}{4}$	...	1	9
Hind leg	1	0	...	1	5
Circumference (girth)	7	0	...	8	4
,, round shell at base	—		...	11	6
Neck and head...	1	$3\frac{1}{2}$	...	1	5
Head	0	7	...	0	7

On 23rd April, 1896, I examined the tortoise, and took the following dimensions, which, for comparison with the foregoing, are reduced to English scale:—

	mm.		Ft.	in.
Carapace.				
Length over curve	1420	=	4	8
,, in straight line	1284	=	4	$2\frac{1}{2}$
Width over curve	1680	=	5	6
,, in straight line	890	=	2	11
Plastron.				
Length	980	=	3	$2\frac{1}{2}$
Width	915	=	3	0
Depth of concavity	130	=	0	$5\frac{1}{8}$
Caudal plate.				
Length	133	=	0	$5\frac{1}{4}$
Width	250	=	0	$9\frac{3}{4}$

Weight, 575 lbs.

* Cox—Proc. Linn. Soc. N.S. Wales, viii, 1884, p. 531.
† *Illust. Lond. News*, 3rd Dec., 1892, p. 715.

The Female Tortoise.

As I learn from Dr. Sinclair, the female was brought to Sydney in 1853 by the American Whaler "Winslow." It was then but a baby and weighed 56 lbs.* No further observations appear to have been made until 1884, when the following figures were published by Dr. Cox (*loc. cit.*):—

	Ft.	in.
Length, nose to tail ("no tail")?	5	$10\frac{1}{2}$
„ shell	4	0
„ across shell	5	0
„ under shell	2	$4\frac{1}{2}$
Girth	6	$7\frac{1}{2}$
Front leg, round elbow	1	5
Head, round	1	3

In 1893 its weight was ascertained to be 368 lbs. About this date it was placed in a paddock with the male, and in September, 1895, it was found to have deposited six eggs in a rubbish heap. These eggs were at once forwarded to the Museum, when I took the dimensions below recorded. The following measurements of the female were made by me in April, 1896. In August of the same year this tortoise died, and as already stated, was forwarded to the Museum. The ovaries were in an enlarged condition, and it seems probable that had she lived, the tortoise would have again produced eggs.

Carapace.	mm.		Ft.	in.
Length over curve	1195	=	3	11
„ in straight line	915	=	3	0
Width over curve	1295	=	4	3
„ in straight line	740	=	2	5
Plastron.				
Length	775	=	2	$6\frac{1}{2}$
Width	740	=	2	5
Depth of concavity	43	=	0	$1\frac{3}{4}$
Caudal plate.				
Length	115	=	0	$4\frac{1}{2}$
Width	185	=	0	$7\frac{1}{4}$

Weight, $320\frac{1}{2}$ lbs.

The depression in the plastron, although much less than in the male, is yet very noticeable; a feature scarcely realised by Dr. Günther when writing his Monograph,† for he regarded the type

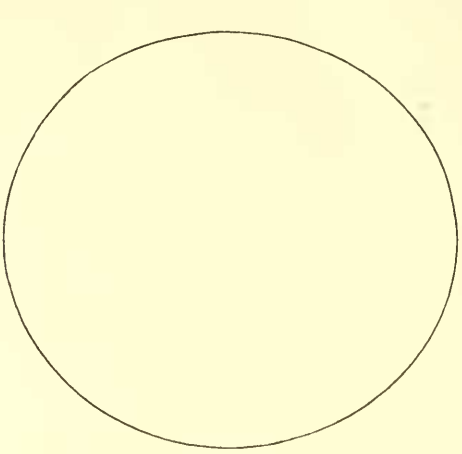
* See also—The Curator's Annual Report for 1897: Report of the Trustees for 1897, p. 6.

† Günther—Gigantic Land Tortoises in the British Museum, 1877, p. 71.

of the species as a young male "inasmuch as the sternum shows a slight concavity." It will be noticed that between 1893 and 1896, the female had lost weight to the extent of about 47 lbs., and that in thirty years the male had lost 67 lbs. It is to be regretted that such little data is available from which to draw deductions. There is no doubt, however, that under Mr. Rothschild's care, future developments of the male will be carefully recorded.

Eggs.

Porter* *(fide* Günther*)* writing on the tortoises of the Galapagos Islands, remarks :—"The eggs are perfectly round, white, and of $2\frac{1}{2}$ inches diameter." A glance at the following table shows that the eggs of *T. nigrita* are not far removed from the spherical, the accompanying cut representing the shape of the egg marked F. Reduced to inches, the longest diameter of the largest example is barely $2\frac{3}{8}$. Darwin† measured an egg having a circumference of $7\frac{3}{8}$ inches. Specimen C measures $7\frac{1}{8}$ inches in circumference.



The egg marked F is the largest, but its weight was disproportionate and actually less than the others. On emptying this egg, the contents were found to be abnormal. It has a very rough surface; all the others are tolerably smooth. Specimens B and E were returned to Dr. Sinclair; the others are in the Museum collection.

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* Porter—Journal of a Cruise made to the Pacific Ocean, New York, 1822, pp. 215, 216.

† Darwin—Voyage of the "Beagle," iii., 1839, p. 464.

EGG.	WEIGHT IN GRAMMES.	DIMENSIONS IN MILLIMETRES.	GREATEST CIRCUMFERENCE.
A.	99·2	56·9 × 53·4	175·2
B.	106·7	56·8 × 55·5	——
C.	109·8	57·8 × 55·5	181·0
D.	105·9	58·2 × 55·2	181·8
E.	106·4	58·9 × 55·0	——
F.	85·8	59·8 × 54·8	180·4

Other Tortoises.

In the Museum collection are four examples of *Testudo nigrita*. These may be tabulated as follows :—

A. The female (and skeleton) already dealt with.
B. A smaller female, mounted in the Museum.
C. Carapace and plastron of another example, possibly a male.
D. Skeleton of a much larger specimen, also believed to be a male.

The last named is the only other one of which I can gather any information. It was brought to Sydney in a schooner about the year 1860, and from that time to the date of its death it was an inhabitant of the Museum grounds. It not infrequently wandered into the street, and on one such occasion a cart collided with it and broke in part of the carapace, the injury being now very apparent. The specimen has not been well cared for in the past, and the mandible and portion of the tail bones have been lost. This collection of four is an interesting one, and shows well to what extent the shape and structure of the shell alters with age. In the younger examples the concentric striæ of the shields are extremely well marked (almost absolute in the adult), the free edges of the carapace are much more deflected, especially on the posterior border, while the costal sutures are more deeply cleft. Another feature exhibited by the immature form is the greater prominence of the knobby protuberances of the carapace.

The dimensions of the three smaller examples have been ascertained, as below :—

	B ♀	C ♂	D ♂
Carapace.	mm.	mm.	mm.
Length over curve	905	840	930
„ in straight line	710	715	755
Width over curve	950	920	960
„ in straight line	540	515	550
Plastron.			
Length	590	580	640
Width	590	510	540

	B ♀	C ♂	D ♂
Caudal plate.	mm.	mm.	mm.
Length	75	75	85
Width	160	150	155

The Skeleton.

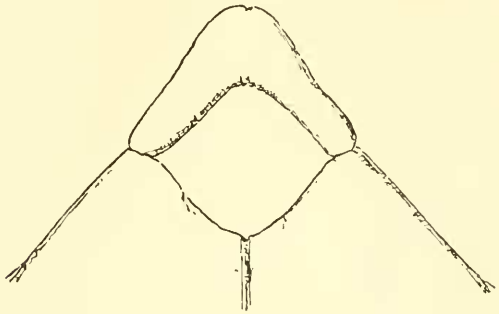
Although I have not now the opportunity of carefully describing and figuring the bones, some measurements have been attempted. Such features have been selected as would be comparable with those of other species of gigantic tortoises rendered by Günther. As already intimated, two specimens are available, namely a larger female (A) and a smaller male (D). It is necessary to mention that, as both the skeletons are articulated, some of the measurements are approximate only :—

	A ♀	D ♂
Pectoral arch.—	mm.	mm.
Scapula, length	220	165
,, least circumference	92	74
Glenoid cavity, greatest diameter... ...	55	48
Coracoid, length	120	86
,, greatest width	94	70
Precoracoid, length...	90	68
Fore limb.—		
Humerus, length	208	200
,, least circumference	110	96
,, head, longest diameter... ...	45	...
,, ,, shortest diameter ...	42	...
,, condyles, breadth	90	73
Ulna, least width	31·5	22
Radius, length	127	...
,, least circumference	64	48
Pelvic arch.—		
Pelvis, ilium to symphysis (vertical) ...	148	125
,, longitudinal diameter ...	*153 – 178	125
,, distance between ilio-pubic prominences	107	80
,, foramen obturatorium	50	32
,, symphysial bridge, width	30	31
,, ,, ,, depth	28	20
,, ischium, least breadth of posterior part	69	63
,, ilium, length	158	110
,, ,, least breadth...	35	27

* See observation and figure on p. 103.

Hind limb.—	A ♀	D ♂
Femur, length	182	150
,, least circumference	99	76
,, head, longest diameter	59	46
,, condyles, breadth	81·5	60
Tibia, length	140	110
,, least circumference	99	76
Fibula, length	134	109
,, least circumference	48	39

In references to the pelvis, I fail to find mention of the epipubic cartilage becoming ossified. Such is distinctly the condition in the skeleton of the female, and the following sketch shows its form and relative position.



This bone is not ankylosed with the pubic, and may therefore be easily lost during the process of maceration. The additional figure in the foregoing table of measurements, is inclusive of this epipubic bone.

The apex of the entoplastral spine reaches a point situated 220 mm. behind the edge of the gular prominence, it has a width of 12 mm., and is quite free from the plastron for 45 mm. at its distal extremity.

The accompanying Plate (xxii.) is reproduced from a photograph of the skeleton of the female, from which one side has been removed to show the internal structure. It will be seen that the horny sheaths covering the jaw have been retained and that the hyoids are suspended in their natural position. The extent and attachment of the epibubic bone, above referred to, may also be traced.